

T16D06 – (16.1) Rate Expression

Name

1. 16.1.1 Distinguish between the terms rate constant, overall order of reaction and order of reaction with respect to a particular reactant. (2)

a. Describe the Rate Constant:

i. What does the value of k (low or high) indicate?

b. Explain the Overall Order of Reaction:

c. Explain the Reaction Order with respect to a particular reactant:

2. 16.1.2 Deduce the rate expression for a reaction from experimental data. (3)

a. What is the generic rate expression for the reaction: $A + B \rightarrow C + D$

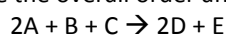
b. How is the rate expression different when using $=$ or \propto

c. What are the two main uses for rate expressions:

i.

ii.

d. Describe the overall order and order with respect to each reactant in the following equation:



$$\text{Rate} = k[A][B]^2[C]^0$$

e. The following expression is at 800K: $\text{Rate} = k[A]^2[B]$ Calculate the rate constant (to 1 decimal place)

Initial rate was $55.0 \times 10^{-5} \frac{\text{mol}}{\text{dm}^3 \text{s}}$ when:

$$[A] = 3.00 \times 10^{-2} \frac{\text{mol}}{\text{dm}^3}$$

$$[B] = 6.00 \times 10^{-2} \frac{\text{mol}}{\text{dm}^3}$$

f. Explain how you can experimentally determine the rate expression for $A + B \rightarrow C + D$

3. 16.1.3 Solve problems involving the rate expression. (3)
4. 16.1.4 Sketch, identify and analyze graphical representations for zero-, first- and second-order reactions. (3)

	Zero Order	1 st Order	2 nd Order
[reactant]/time			
rate/[reactant]			
rate/[reactant] ²			
ln[reactant]/time			
(1/[reactant])/time			

5. Half-life for 1st order reactions:
- What is the equation for the half-life of a 1st order reaction?
 - The half-life of a 1st order reaction is 100 seconds calculate its rate constant:
 - A 1st order reaction has a rate constant of 0.100s^{-1} calculate the half-life:
 - Draw a graph of [reactant]/time for changing constants (k)